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EXAMINER

PALABRICA, RICARDO J

ART UNIT PAPER NUMBER

3641

DATE MAILED: 08/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/683,343

Applicant(s)

FENNERN, LARRY EDGAR

Examiner

Rick Palabrica

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e., failing to provide an enabling disclosure.

The claimed invention is a modular reactor containment system for a boiling water reactor. However, there is no adequate or enabling disclosure of how such could be accomplished using the applicant's invention.

On page 2, paragraph 0009, lines 3+, the applicant discloses that the claimed containment vessel is smaller than known containment vessels and can be shop fabricated off-site for quick installation on-site. The disclosure is insufficient as to exactly how much "smaller" is his containment vessel compared to "known" containment vessels. Also, the disclosure is insufficient as to what exactly are these "known" containment vessels that the applicant uses to compare the size of his claimed

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invention. The same observation applies to applicant's reference to "known relatively large and expensive concrete or steel containment vessels" in lines 5+ of same paragraph.

On page 3, paragraph 0010, lines 1+, the applicant discloses that the boiling water reactor with compact, dry containment also employs a simple safety system for coping with a loss-of-coolant accident (LOCA). The disclosure is insufficient as to what exactly are the principal parameters of the boiling water reactor to which his claimed contained system is directed, e.g., thermal power, operating pressure, coolant temperature, coolant flow rate, nuclear fuel attributes, etc.

On page 3, paragraph 0013, lines 1+, the applicant discloses that sidewall 24 includes a top flange 30 which "mates" with removable top head 22, and that top flange 30 facilitates installation of top head 22. There is neither an adequate description nor enabling disclosure as to how and in what manner: 1) said top head is so "mated" with sidewall through the top flange (e.g., by bolting, welding, brazing, or what?; 2) said mating arrangement ensures that leakage from the containment to the surrounding environs is kept within design or licensing limits.

On page 3, paragraph 0014, lines 1+, the applicant discloses that his containment vessel is capable of containing a high-pressure fluid such as the steam, water and gas mixture anticipated in a loss-of-coolant accident. The disclosure is insufficient as to what exactly is meant by the term, "containing", i.e., 100% containment of said fluids without any leakage from the containment to the atmosphere?

On page 4, lines 1+, the applicant discloses the thickness range of the cylindrical sidewall, as well as the range of pressures his containment vessel is capable of containing in the event of a LOCA. The disclosure is insufficient as to what exactly are the principal LOCA parameters that form the design basis of the containment, e.g., pressure and temperature values as a function of time after the accident, specific location of pipe rupture, etc. Also, what exactly are the assumptions, estimates and approximations used in the design basis analysis of the containment, e.g., net free volume, containment leak rate, etc. What exactly are the analytical or experimental models utilized to determine said thickness and pressure ranges, and what exactly are the methods to verify correctness of said thickness and pressure ranges.

On page 4, paragraph 0015, the applicant discloses the volume of the containment vessel and the ratio of the containment cavity volume to the RPV volume, said quantities being based on an assumed LOCA. The same observation as above applies regarding insufficiency of the disclosure as to the principal LOCA parameters, assumptions, estimates, approximations, and models for determination and verification of said containment vessel volume and volume ratio of cavity to RPV.

On page 5, paragraph 0019, lines 1+, the applicant discloses that a containment cooling system 44 is coupled to containment vessel 14. There is neither an adequate description nor enabling disclosure as to how and in what manner said "coupling" is so provided, e.g., what exactly is this "coupling" (i.e., mechanical, electrical, structural, etc.), where exactly in the containment is said "coupling" located, what exactly are the

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isolation devices associated with said "coupling", if any, and where exactly are they located in the system, etc.

On page 5, paragraph 0019, lines 5+, the applicant discloses that inlet line 50 provides fluid communication between condensers 48 and drywell 28. There is neither an adequate description nor enabling disclosure as to how and in what manner said fluid communication is so provided, e.g., where exactly is the location of this drywell penetration, and what exactly are the provisions for isolation of the drywell from the condensers. The same observation applies to the recitation in paragraph 0021, lines 7+. Additionally, the applicant discloses that the isolation condensers are used to condense the steam from the drywell in the event of a LOCA. However, the disclosure is insufficient as to what exactly is the capacity of this isolation condenser in order to effectively perform its emergency function.

On page 5, paragraph 0019, last sentence, the applicant discloses that in another embodiment, injection line 54 extends into RPV 12 and condensate is returned directly to RPV 12. The disclosure is insufficient as where exactly in the RPV said condensate is returned.

On page 5, paragraph 0020, lines 2+, the applicant discloses that drywell 28 is in fluid communications with RPV 12 by at least one remotely actuated drywell valve 66. There is neither an adequate description nor enabling disclosure as to how and in what manner said fluid communication is so provided, e.g., where exactly in the RPV is the water from the drywell injected, when exactly into the accident would said water injection be done (i.e., what happens if a low RPV water is detected during an early

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phase of an accident when there is still no water or insufficient water in the drywell, where would the RPV injection water come from?), etc. Also, the disclosure is insufficient as what exactly is meant by the term, "remotely" actuated drywell valve, i.e., what exactly is the reference point for "remote."

On page 6, paragraph 0021, lines 9+, the applicant discloses that water collected in drywell 28 can be directed into RPV 12 through valves 66 thereby cooling the core. There is neither an adequate description not enabling disclosure as to how and in what manner said drywell water is so directed to the cause cooling the core. The disclosure is insufficient as what exactly are the components of said system, how they are interconnected and what their ratings should be. Also, the disclosure is insufficient as to what exactly must be the flow rate to effectively cool the core.

The disclosure is insufficient in failing to set forth, operative embodiments or examples of the invention, including parameters, such as, 1) principal parameters of a boiling water reactor to which the claimed containment is directed including, thermal power, operating pressure, coolant temperature, coolant flow rate, nuclear fuel attributes, etc; 2) principal LOCA parameters that form the design basis of the containment, including pressure and temperature values as a function of time after the accident, specific location of pipe rupture, etc. ; 3) assumptions, estimates and approximations used in the design basis analysis of the containment, e.g., net free volume, containment leak rate, etc.; 4) analytical or experimental models utilized to determine said thickness and pressure ranges; 5) methods to verify correctness of said thickness and pressure ranges; 6) capacity of isolation condensers and required water

flow rate from the drywell to the core, etc. Examples and description should be of sufficient scope as to justify the scope of the claims. See MPEP 608.01(p).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 1-21 are rejected under 35 U.S.C. 101 because the claimed invention as disclosed is inoperative and therefore lacks utility.

The reasons the invention as disclosed is inoperative are the same as the reasons set forth in section 1 above as to why the disclosure is objected to, and said reasons are incorporated herein.

Claim Rejections - 35 USC § 112

3. Claims 1-21 are rejected under 35 U.S.C. 112, first paragraph, for the reasons set forth in the objection to the specification in section 3 above.

4. Claims 2, 3, 5, 10, 13, 15, 20 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2, which is dependent from claim 1, is poorly written. Claim 1 recites a pressure rating of at least 50 atmospheres whereas claim 2 provides for this pressure rating to be less than 50 atmospheres, i.e., it can be zero. Therefore, the two claims are obviously conflicting. The examiner suggests re-writing claim 2 to read: "A containment vessel in accordance with Claim 1 wherein said containment vessel has a pressure rating of not more than 150 atmospheres."

Claims 10 and 21 are also poorly written and suffer from the same conflicting syndrome as above. Suggest revising these claims to read, "... wherein said containment vessel cylindrical thickness wall comprises a thickness of at least 15 centimeters but not more than 30 centimeters.

Claims 3 and 13 recite the limitation "low alloy steel" in line 2 of both claims. The term "low" is relative that can be given no definite meaning and accordingly render the claims vague and indefinite, and the metes and bound thereof are undefined.

Claims 5 and 15 recite the limitation "remotely actuated" in line 2 of both claims. The term "remotely" is relative and no reference point is specified as to the location of the actuator with respect to the valve. Thus, "remotely" can be given no definite meaning and accordingly render the claims vague and indefinite, and the metes and bound thereof are undefined.

Claim 20 recites the limitation "said support part" in lines 3 and 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 6 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Rigg (U.S. 3,937,351). Rigg discloses in Fig. 1-6 a double contained pressure vessel for a steam-generating nuclear reactor. Said pressure vessel constitutes a steam-water separating drum having an inner and outer containment, hemispherical end covers 13, a plurality of penetrations 9, and the outer containment is made of low alloy steel (see column 2, lines 10+). This double-contained pressure vessel has an operating pressure of 6.6×10^6 N/m² (approximately 65 atmospheres) (see column 1, lines 55+). This pressure vessel is connected to the calandria vessel 6 containing pressure tubes 5, said connection through a downcomer 3, a pump 4, and an isolating valve 4a (see Fig. 1).

Applicant's claim language reads on Rigg's invention as follows: "reactor vessel" reads on the inner pressure vessel, "containment vessel" reads on the outer pressure vessel, "bottom head" reads on left hand cover 13 of the double contained pressure vessel, "removable top head" reads on right hand cover 13 of the double contained

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pressure vessel, "cylindrical sidewall" reads on the cylindrical body of the outer pressure vessel, and "remotely actuated valve" reads on isolating valve.

Note that the clauses in claim 1, i.e., "for a boiling water reactor, the boiling water reactor comprising a reactor pressure vessel" and "to receive and enclose a reactor pressure vessel", are statements of intended or desired use. Thus these statements do not serve to patently distinguish the claimed structure over that of the reference. See In re Pearson, 181 USPQ 641; In re Yanush, 177 USPQ 705; In re Finsterwalder, 168 USPQ 530; In re Casey, 152 USPQ 235; In re Otto, 136 USPQ 458; Ex parte Masham, 2 USPQ 2nd 1647.

See also MPEP 2114 that states:

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647.

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531.

Apparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528.

Note also that claim 1 does not disclose the reactor pressure vessel as being enclosed by the containment vessel. Note also that a steam drum such as the apparatus of Rigg can be used in a boiling water reactor.

As to the limitation in claim 1 regarding a "removable top head" note that this is an inherent property of Rigg's pressure vessel because there has to be access to the

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components disposed inside the vessel which could be through the top head.

Additionally, said top head is "removable" anytime by cutting it off from the main body, e.g., by a welding torch.

As to the limitation in claim 4, note that the outer pressure vessel is in physical contact with the inner pressure vessel and therefore the two volumes are almost the same except for the volume associated with the thickness of the inner pressure vessel. Therefore the claim limitation of the containment cavity having a volume less than 4 times the reactor vessel volume is met.

As to the limitation in claim 5 regarding a remote isolation valve for the "drywell," the claim does not define the term "drywell." Said claim language reads on the isolation valve 4a, which is shown in Fig. 1 of Rigg as being remote from pressure vessel 1.

As to the limitation in claim 9 regarding off-site manufacture of the bottom head and sidewall into a substantially complete one piece, this is a matter of obvious engineering that does not make the claimed invention patentably distinguishable from prior art. See MPEP 2144.04.II.V.B.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamaru et al. (U.S. 2002/0085660) in view of Gaines et al. (U.S. 3,744,660) and further in view of Kobayashi (U.S. 4,576,784). Nakamaru et al. disclose applicant's claims except for the pressure rating of the containment vessel and its thickness.

Nakamaru et al. disclose a boiling water reactor nuclear power plant with a compact system configuration (see Figs. 1-15). Fig. 2 shows a boiling water reactor comprising a reactor pressure vessel 201, a reactor core inside the pressure vessel 202, a metal steel containment vessel 401 enclosing said pressure vessel, and the containment vessel comprising a bottom head, removable top head, and a substantially cylindrical sidewall. Note in Fig. 14 that the top head of the containment vessel is removable as evidenced by the pressure vessel being lifted through an opening on top of the reactor building. There is a drywell 231 about the open circumference of the pressure vessel 201. This drywell and a pressure suppression pool are inside the containment vessel. There is a plurality of containment penetrations (407, 234, 430, etc). An isolation condenser 225 is provided (see Fig. 3). There is a guard pipe 407 that encloses a depressurization valve that is part of the emergency core cooling system, said pipe guard drains into the containment vessel. There is a plurality of isolation valves between the containment vessel and the reactor pressure vessel (see Fig. 3).

As to the limitation in claims 5 and 15 regarding a remote isolation valve for the "drywell," the claim does not define the term "drywell." Said claim language reads on

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depressurization valve 224, which is shown in Fig. 3 of Nakamaru et al. as being remote from pressure vessel 201.

As to the limitation in claims 9 and 20 regarding off-site manufacture of the bottom head and sidewall into a substantially complete one piece, this is a matter of obvious engineering that does not make the claimed invention patentably distinguishable from prior art. See MPEP 2144.04.II.V.B.

As to the limitation in claims 4 and 14, one can always find "**a volume**" (or a space) within the containment cavity such that said volume (or space) is less than 4 times "**a volume**" (or a space) within the reactor pressure vessel.

Gaines et al. teach that the pressure in boiling water reactor systems is about 1000 psi (approximately 68 atmospheres).(see column 1, lines 18+). Kobayashi teaches a boiling water reactor having a reactor pressure vessel with a thickness of about 30 cm. (see column 6, lines 9+). One having ordinary skill in the art would have recognized that the containment vessel of Nakamaru et al. acts in the same manner as a second pressure vessel enclosing the pressure vessel containing the reactor core, and it would have been prima facie obvious to conservatively make second pressure vessel have the same attributes as the primary pressure vessel.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by Nakamaru et al., by the teachings of Gaines et al. and Kobayashi, to have a containment vessel having a pressure rating of between 50 and 150 atmospheres, and a sidewall thickness of between 15 and 30 cm, because such modification is no more than the use of

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conventional designs/techniques within the nuclear art, and the use of well-known parameters for pressure retaining components of a boiling water reactor.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References E-H further illustrate prior art. References E and F specifically illustrate the use of a steam drum in a boiling water reactor.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 703-306-5756. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 703-306-4198. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

RJP
August 1, 2002


SUPERVISORY PA/INT LIAISON